

BOTANY.—*The vegetative characters of the bamboo genus Phyllostachys and descriptions of eight new species introduced from China.*<sup>1</sup> F. A. McCLURE, Office of Foreign Agricultural Relations and Smithsonian Institution.

#### INTRODUCTION

This paper represents a portion of the results of accumulated observations that were being correlated (under a Fellowship granted by the John Simon Guggenheim Foundation) in a comprehensive treatment of *Phyllostachys* and other Chinese bamboo genera. That study was interrupted shortly after the outbreak of hostilities in the Pacific area, and attention was turned to more urgent work on Western Hemisphere bamboos on behalf of the United States Government.

The occasion for hastening the publication of this part of the study is the special emphasis that the present emergency has given to the importance and industrial promise of this genus for Western Hemisphere economy. The genus *Phyllostachys* supplies the bulk of all the industrial bamboo culms and the edible bamboo shoots utilized in China and Japan and also practically all the bamboo culms exported by Japan to this country in pre-war times. The young shoots of the bamboos of this genus are, without exception, edible. Moreover, their full-grown culms are known to be an excellent source of paper pulp. It is estimated that 80 percent of all the paper consumed in China comes from this genus. Recent special experimental studies carried out in the United States indicate that bamboos of this genus are entirely suitable, technologically, for the manufacture of Western types of paper by modern methods.

Bamboos of this genus thrive in well-watered, warm-temperate areas such as comprise much of our west coast, our east coast south of Washington, D. C., and the Gulf States (excluding parts of Florida), and similar areas in Latin America, where bamboos of the more cold-sensitive tropical genera cannot be grown.

Living plants of the principal species of *Phyllostachys* used in China and Japan are already available in this country. Some of

these have been growing here for nearly 40 years without having been given a comprehensive trial or special study. The U. S. Department of Agriculture has living plants of 21 species and 4 recognized forms or varieties in this genus. Of these, apparently only 11 species and 3 varieties have been formally described and given scientific names. It is assumed that making available a knowledge of the distinctive characters of the individual kinds for purposes of identification, and providing valid, documented names where these are lacking, will help to focus interest on the species of this genus, encourage experiments in their cultivation, and stimulate scientific investigations of their technological properties.

Eight of the ten aforementioned species presumed to be new are here described. The available plants of the other two are as yet too young to show fully their distinctive characters. A more comprehensive treatment of the genus, embracing all the species under cultivation in this country, with keys for use in field identifications, is under preparation.

The descriptions are based on field observations of the living plants, and the characters used are drawn from the vegetative organs. The characters of these structures, particularly those of the nodes and internodes of the culm itself, and the culm sheaths, are quite as distinctive as the characters of the traditionally used reproductive organs (flowers and fruits) and have the advantage of being available for purposes of field identification.

The measurements of the parts of the culm sheath and the leaves are based on dry material. The Roman numerals appearing in the descriptions refer to the serial number (within the respective series) of the culm node, internode or sheath (as the case may be), counting as "I" the first one above the ground level in the series of a given structure.

The P.I. number, under which the pedigree of each introduction is published in the Plant Inventory of the Division of Plant

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Exploration and Introduction, is given for each species. The reader is enjoined to caution, however, in the use of these numbers as means of identifying bamboos in the field. In the course of time labels often become inadvertently transferred. Identifications should always be verified by reference to published descriptions giving vegetative characters, or by having specimens (particularly representative culm sheaths) compared with the types or authentically named reference specimens.

The bamboos here described were all introduced into this country from China. They have been established and propagated at the field stations of the Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture. Most of them have also been grown by E. A. McIlhenny in his bamboo garden at Avery Island, La.

Much of the preliminary study of this genus was done in the Bamboo Garden established by the writer in 1925 at Lingnan University, Canton, China. Invaluable assistance has been given through the years by R. A. Young, assistant horticulturist, Division of Plant Exploration and Introduction, and by David Bisset, chief scientific aid in charge of the Barbour Lathrop Plant Introduction Garden, Savannah, Ga., in making the permanent plantings at the Garden available for study. Through the courtesy of Dr. W. R. Maxon, curator of the U. S. National Herbarium, and Mrs. Agnes Chase, custodian of grasses, the writer has had not only the necessary storage and laboratory facilities but also access to the types and type collections of bamboos preserved there. The types of the species here described will be deposited in the U. S. National Herbarium.

The illustrations show inner and outer aspects of the apex and blade of representative culm sheaths from lower, middle, and upper levels of mature-sized culms. The scale is  $\times 1$ . My pencil sketches were inked by Agnes Chase.

No effort has been spared to make the descriptions accurate and adequate, but it will not be surprising if, in describing such

extremely variable and inadequately known plants as these, some omissions have occurred or errors in detail have escaped detection. Notices of needed corrections will be gratefully received.

The bamboo plant is a complex organism that, like most woody perennials, takes a number of years to reach mature stature. During this developmental period the vegetative structures, particularly the culm sheaths, usually assume a more or less generalized form, and in most species it is only as the plant approaches mature stature that these structures exhibit the characters by which the different kinds may be distinguished with confidence.

The descriptions and figures here presented are based on plants presumed to have reached their approximate mature stature. The reader is cautioned against trying to use them to identify plants of immature stature. It must be remembered, too, that there is a certain degree of variation in any array of examples of a given structure, even where these are all taken from a single plant. Moreover, the internodes, nodes, branch complements, and culm sheaths, from the different levels in the culm, show different forms. It should not be surprising, then, if it should prove difficult to identify specifically a single example taken at random from the series. Foliage specimens alone are usually of little or no value for purposes of specific identification.

The most useful single organ is the culm sheath. But an adequate specimen should include examples (from the same culm if possible) representing the basal, middle, and upper part of the series, and so labelled. Next in importance for purposes of identification (when used in conjunction with the culm sheaths) are specimens of the lower one or two meters of the mature culm itself. The branch complement, and internodes within the branched part of the culm, are principally useful for generic identifications. Finally, the more completely the specimen represents the plant, and the more adequate the supplementary notes, the more reliable the identification may be.



## VEGETATIVE CHARACTERS OF PHYLLOSTACHYS

*Clump habit* dumetose (thicketlike), actively spreading, open to more or less densely crowded; *rhizomes* indeterminate (advancing indefinitely underground), slender, with short internodes and more or less swollen nodes, every node gemmiferous (bearing a bud); *culms* arising from buds on the rhizome usually more or less distantly spaced, erect or suberect, never climbing; *internodes* of the culms hollow, cylindrical or nearly so above, the lower nodes, when these have no buds or branches, sulcate (with a broad groove) from base to tip above, gemmiferous or branching nodes, usually with a narrow, more or less copiously farinose zone just below each node; the *nodes* of the culm all bearing branches in culms of very young plants (i.e., of juvenile stature), those in the lower half or so of the culm typically without buds or branches in culms arising from plants of mature stature, the nodes (at least the branch- or bud-bearing ones) double, i.e., with a distinct ridge encircling the culm just above the more or less prominent sheath scar; *culm sheaths* promptly deciduous, the ligules and blades progressively longer in sheaths at higher nodes of the culm; branch buds usually present at all of the nodes in small culms, especially those from young plants, lacking at the lower nodes (often half or more of the complete series) of culms of mature size from mature plants, but always present at all of the upper nodes, all usually developing very promptly, but one to several of the lower in the series *very rarely* (as, for example, in *Phyllostachys propinqua*) remaining dormant after the culm sheaths have fallen; *branches* often solitary in the lower part of the series, otherwise typically two at each node, the two usually more or less strongly unequal, with a third, usually very much smaller, sometimes developing between the two (atypically, and rarely, in exceptional culms, the branches clearly ternate, with the strongest one in the middle); *leaf blades* lanceolate to linear-lanceolate, with clearly tessellate venation, i.e., with transverse veinlets clearly visible at least on the lower surface, the lower surface usually manifestly paler than the upper surface and often definitely glaucous.

*Phyllostachys angusta*, sp. nov.

Species staturae inferioris internodiis culmi

comparate elongatis, auriculis et setis oralibus in vaginis culmi haud evolutis, vaginis culmi et in apice et in ligula et in lamina angustissimis insignis. Species in notis nonnullis simulans *Ph. flexuosam* Riv. sed in characteribus saltem sequentibus distinguenda: culmorum internodiis primo vix (dempta zona angusta infra nodos) farinosis, ligula vaginarum culmi longe fimbriata haud purpurata, auriculis setisque oralibus in vaginis foliorum saepe haud evolutis.

*Culmi* usque ad 3.5 m alti et (int. V) 13 mm diametro, omnino glabri; *internodia* primo viridia nitidaque, deinde sensim levissime farinosa, usque (no. IX) ad 191 mm (V: 163 mm) longa, *ligno* circ. 3 mm crasso; *nodi* prominuli; *vaginae culmi* oblongae vel lineares, apicem versus leniter angustatae, dorso vulgo omnino glabrae, saepe (demptis plantis immaturis) sparsim fusco-maculatae, omnes siccitate pallide stramineae, conferte nervosae et coriaceae; *auriculae* et *setae orales* haud evolutae; *ligula* longe exserta (haud decurrens) angusta, dorso subtiliter strigosa, apice (interdum plus minusve oblique) truncata, margine vulgo undulata (in vaginis superioribus saepe lacerata) in vaginis inferioribus ciliata, in superioribus cum processibus scabris fimbriata, fragilis et vulgo mox diffracta; *lamina* anguste linearis, plerumque plus minusve patens (infimis raro valde reflexis), plana vel siccitate saltem plus minusve alveata, utrinque subtiliter scabra, secus margines antrorse scabra. *Rami* ramulique plerique 3-, raro 4-foliati, dempto internodio ultimo glabri, vaginis ramorum ramulorumque saepe plus minusve valde scabris. *Foliorum vaginae* pleraeque hispidulae, infimae glabrescentes; *auriculae* et *setae orales* et in ramis primariis culmorum hornotinorum et in culmis humilibus vel praesertim robustis interdum plus minusve valde evolutae, alioquin saepe haud evolutae; *ligula* longe exserta, dorso subtiliter hispidula, apice arcuata, margine valde undulata, in ramis ramulisque culmorum hornotinorum vulgo dense ciliolata, alioquin vulgo vix vel haud ciliolata; *petiolus* in ramis ramulisque culmorum hornotinorum vulgo utrinque glaber vel supra subtiliter puberulus; *laminae foliorum* usque ad 130 mm longae et usque ad 18 mm latae, lineari-lanceolatae, supra semper glabrae et nitidae, subtus vulgo ima basi hirsutae, alioquin secundum aetatem plantae pervariabiliter pubescentes, margini-

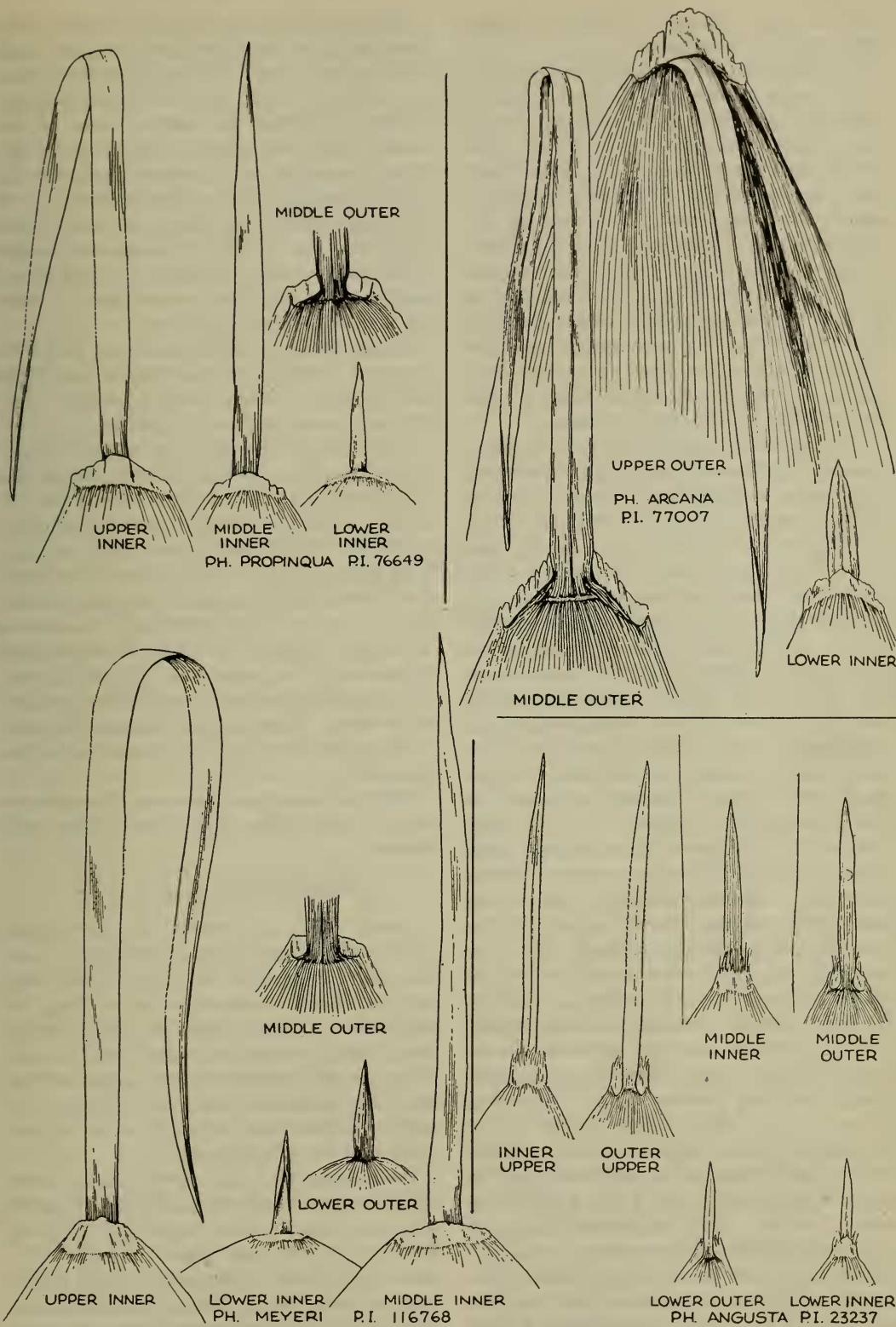


FIG. 1.—New species of *Phyllostachys*.



bus vel utrisque spinulosis vel altero ab initio glabro. *Inflorescentia* ignota.

This rather small species is distinguished by the following characters: Unusual length of internodes in relation to the diameter of the culm, their almost complete lack of white powder, the very narrow apex, ligule, and blade of the culm sheath, the fimbriate margin of the ligule in the upper culm sheaths, and the lack of auricles and oral setae in the culm sheath.

Species resembling *Phyllostachys flexuosa* Riv. in some characters but distinguished by the very narrow apex, ligule, and blade of the culm sheath, by the prominently fimbriate margin of the ligule in the upper culm sheaths, and by the almost complete lack of white powder on the internodes of the culm.

*Culms* up to 3.5 m tall and (int. V) 13 mm in diameter, glabrous throughout; *internodes* bright green and shining at first, then very lightly, almost imperceptibly, farinose, up to (no. IX) 191 mm (V: 163 mm) long, the *wood* about 3 mm thick; *nodes* moderately prominent; *culm sheaths* oblong or linear, gently narrowed toward the apex, usually entirely glabrous on the back, sparsely maculate (except in very young plants), pale stramineous, thin, tough and rather prominently ribbed when dry; *auricles* and *oral setae* lacking; *ligule* long-exserted, not at all decurrent, very narrow, obscurely strigose on the back, the apex (often more or less obliquely) truncate, the margin irregularly undulate (in the upper sheaths often lacerate), ciliate in the lower sheaths, fringed with scabrous processes in the upper ones, fragile and commonly soon broken; *sheath blade* narrow, linear, ascending (the lower ones rarely strongly reflexed), flat or, at least when dry, more or less trough-shaped, obscurely scabrous on both surfaces, scabrous along both margins. *Branches* and twigs usually 3-, rarely 4-foliate, glabrous with the exception of the uppermost internode, the branch sheaths and twig sheaths often more or less scabrous to the touch. *Leaf sheaths* mostly hispidulous, the lower ones glabrescent; *auricles* and *oral setae* more or less well developed in culms of the current year or in small or especially robust plants, otherwise often not developed at all; *ligule* long-exserted, obscurely hispidulous on the back, the apex arched, the margin strongly irregular, in leaves of branches and twigs of the current year usually densely

ciliate, otherwise scarcely or not at all ciliate; *petiole* in leaves of branches and twigs of the current year, usually densely puberulent on both the upper and the lower surface, otherwise glabrous on both surfaces or obscurely puberulent on the upper surface; *leaf blades* up to 130 mm long and up to 18 mm broad, linear-lanceolate, always glabrous on the upper surface, commonly hirsute at the base, otherwise of variable pubescence on the upper surface, according to the age of the plant, both margins spinulose or one glabrous from the first. *Inflorescence* unknown.

TYPE: McClure 21023, collected May 30-August 3, 1942, at the Barbour Lathrop Plant Introduction Garden near Savannah, Ga., from permanent plot no. 11 (section C).

This bamboo was originally introduced into this country from China by Frank N. Meyer. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 23237, where the following facts concerning it are recorded from the original field notes: The propagating material was secured in the autumn of 1907 from the vicinity of Tangsi, Chekiang Province, where the plant is known by the name *Sah Chu* (Mandarin), i.e., Stone Bamboo, on account of the hardness of the stems. These are described as being used in China principally for the manufacture of fine furniture.

The specific epithet alludes to the relatively narrow apex, ligule, and blade of the culm sheath.

#### *Phyllostachys arcana*, sp. nov.

Species insignis culmis omnino copiose farinosis glabrisque, nodis prominentibus, auriculis et setis oralibus in vaginis culmi haud evolutis, ligula vaginarum culmi longa et valde arcuata, saepe longe et anguste decurrens, lamina vaginarum culmi haud vel vix crispa. Species valde affinis *Ph. nudae* McClure sed ligula vaginarum culmi valde arcuata et in vaginis saltem inferioribus longe et anguste decurrente clare distinguenda.

*Culmi* usque ad 7.5 m alti et (int. V) 29×31 mm diametro, omnino copiose farinosi, glabri; *internodia* tactu striata, usque (no. XVI) ad 305 mm (V: 265 mm) longa, *ligno* (int. V) 4 mm crasso; *nodi* valde prominentes; *vaginae culmi* apicem versus sensim angustatae, in plantis staturae maturae vulgo cum maculis

fuscis sparse obsitae, superioribus interdum fere immaculatis, saepe tactu omnino laeves sed interdum (saltem in parte superiore, in culmis humilibus fere omnino) inter nervos validos cum papillis vel unguellis antrorsis asperae, interdum in medio culmi apicem versus (circa basin laminae) pilis mollibus plus minusve dense pubescentes; *auriculae* et *setae orales* haud evolutae; *ligula* dorso antrorse scabra (saepe dense et minute puberula) apice valde arcuata, secus marginem undulatam ciliolata fragilissima mox diffracta, alioquin pervariabilis: in vaginis inferioribus et in medianis, saepe infra basin et anguste et longe decurrens, in superioribus valde exserta; *lamina* patens, plus minusve alveata undulansque, in superficie abaxiale scabra, in adaxiale glabra vel subglabra, secus margines subtiliter scabra vel subscabra, eis in vaginis infimis brevibus plerisque subcordatis vel lanceolatis, interdum valde reflexis, superioribus lanceolata-linearibus, patentibus, glabris. *Rami* ramulique glabri, plerique 2-3-foliati. *Foliorum vaginae* (dempto ultimo pubescente) glabrae vel glabrescentes; *auriculae* et *setae orales* haud evolutae nisi forsitan in plantis juvenilibus; *ligula* longe exserta, dorso scabra, apice arcuata, margine fere glabra vel subtiliter ciliolata; *petiolus* supra versus basin vulgo puberulus, alioquin omnino glaber; *foliorum laminae* lanceolatae vel lineari-lanceolatae, usque ad 154 mm longae et usque ad 20 mm latae, plerumque multo breviores angustioresque, utrinsecus glabrae (in culmis humilibus vel senescentibus interdum subtus setulosae) secus marginem alterem omnino glabrae, secus alterem scabrae. *Inflorescentia* ignota.

Species distinguished by the following characters: Culms glabrous throughout and copiously farinose, the nodes prominent, the long, strongly arched ligule of the culm sheath often long and narrowly decurrent in the lower sheaths and not at all or scarcely so in the upper ones. Species closely resembling *Phyllostachys nuda* McClure, from which it may be distinguished by its strongly convex culm sheath ligule which, in the lower sheaths, is often narrowly decurrent far below the base of the sheath blade.

*Culms* up to 7.5 m tall and (int. V) about 29×31 mm in diameter, entirely glabrous, conspicuously farinose with loose white powder, especially immediately below the nodes; *inter-*

*nodes* up to (no. XVI) 305 mm (V: 265 mm) long, the surface perceptibly ribbed, the *wood* about 4 mm thick; *nodes* rather prominent; *culm sheaths* oblong to linear, gently rounded toward the apex, the lower ones commonly bearing some small dark spots, the upper ones often entirely immaculate, glabrous to the touch or often (at least in the upper part) scabrous between the crowded veins, those in the middle of the culm often pubescent at and near the base of the sheath blade, tough and husklike though easily split when dry, the veins then very prominent and close together; *auricles* and *oral setae* not at all developed; *ligule* scabrous on the back (often densely and finely pubescent) the apex strongly convex, ciliolate along the undulate margin, very fragile and soon more or less broken, otherwise quite variable: in the sheaths at the lower and median levels of the culm often narrowly decurrent far below the base of the sheath blade, at the upper levels strongly exserted and usually not markedly decurrent; *sheath blade* more or less patent, trough-shaped and undulate, scabrous on the abaxial surface, glabrous or subglabrous on the adaxial surface, obscurely scabrous or subglabrous along the margins, those on the lower sheaths very short, cordate or lanceolate, sometimes strongly reflexed, those on the upper sheaths lanceolate-linear. *Branches* and twigs glabrous, usually 2-3-foliolate. *Leaf sheaths* (excepting the uppermost which is more or less pubescent) glabrous or glabrescent; *auricles* and *oral setae* not at all developed; *ligule* long exserted, scabrous on the back, convex at the apex, glabrous or obscurely ciliolate along the margin, very fragile and soon more or less broken; *petiole* puberulent on the upper surface near the base only, otherwise entirely glabrous; *leaf blade* up to 154 mm long and up to 20 mm broad, usually glabrous on both surfaces (sometimes setulose on the lower surface in old culms) entirely glabrous along one margin, scabrous on the other. *Inflorescence* unknown.

TYPE: McClure 20980, collected April 29, 1941, at the Barbour Lathrop Plant Introduction Garden near Savannah, Ga., from permanent plot no. 32 (section C).

This bamboo was originally introduced into this country from China in 1926 by the writer while acting as agricultural explorer for the U. S. Department of Agriculture. It appears



in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. no. 77007, where the following facts concerning it are recorded from the original field notes: Propagating material, in the form of rhizomes with culms attached, was secured November 3, 1926, under the name *Lao Chu* (Mandarin) or *Lo Chuk* (Cantonese) at (Pe Ssz Kung) Chih-washan, Anhwei Province, where it was observed both in the wild and under cultivation. A height of 4-6 m and a diameter of 2-2.5 cm were recorded for the culms. The shoots are said to be edible, and the culms are used in weaving (for matting) and for making lanterns.

The specific epithet alludes to the obscurity of reliable characters which made it difficult at first to distinguish this from *P. nuda*.

***Phyllostachys aureosulcata*, sp. nov.**

Species insignis internodiis culmi et ramorum hornotinorum (in plantis staturae maturae) ab initio scabris, sulcis cum colore aut lutea aut viridi-aureo omnino in striis tinctis; vaginis novellis culmi saepissime cum striis albidis, luteis, viridibus et vinaceis notatis, eisdem etiam in statu siccato ut striis dilute- et fuscostramineis permanentibus; auriculis vaginarum culmi vulgo validissime evolutis excurrentibus, ligula ampla apice valide arcuata, lamina latiuscula vix crispa. Species in notis nonnullis simulans *Ph. nidulariam* Munro sed in characteribus sequentibus distinguenda: internodiis culmi ramique in sulco cum colore lutea vel viridiaureo tinctis; internodiis culmorum hornotinorum (saltem staturae maturae) scabris; vaginis culmi vulgo omnino glabris, texturae tenuioris; ligulis vaginarum culmi longioribus; cicatricibus in nodis culmorum minus prominentibus et semper omnino glabris; internodiis comparate brevioribus et nodis minus prominentibus.

*Culmi* usque ad 7.8 m alti et (int. V) 29 mm diametro; *internodia* usque (no. XIII) ad 356 mm (V: 196 mm) longa, primo (praesertim in parte culmi inferiore) plus minusve copiose farinosa et retrorse scabra, in sulco colore aut lutea aut viridi-aureo (vel omnino vel in striis) tincta, alioquin primo viridia deinde sensim olivacea vel (saltem culmis valde insolatis) aurescentia; *nodi* glabri, prominuli; *zona farinosa* vulgo cicatricem superans; *vaginae culmi* oblongae, versus apicem plus minusve late

rotundatae, texturae tenuis lentaeque, colore variabilis, semper cum striis albidis, luteis et (praesertim versus basin culmi) vinaceis et (praesertim in parte culmi superiore) viridibus, (his et porro etiam in statu siccato cum striis et dilute- et fuscostramineis permanentibus) plus minusve valide notatae, primo copiose et laxae (in plantis staturae immaturae leviter) farinosae, infimis basi interdum (rarissime) retrorse scabris, alioquin omnibus omnino glabris; *auriculae* interdum in eodem culmo pervariabiles, in vaginis 4-5 infimis vulgo haud evolutae, alioquin vulgo valde evolutae, falcatae vel ovatae, raro omnino debiliter vel haud evolutae, vulgo e basi laminae decurrentes, interdum e basi laminae distinctae, saepissime plus minusve excurrentes, interdum reflexae, interdum novellis vinaceotinctis, in sicco tenues, fragiles, stramineae, plus minusve crispae; *setae orales* paucae vel plures vel quum auriculis nullis tum haud evolutae, vulgo in margine exteriori auricularum confertae; *ligula* usque (in V) ad 3-4 mm longa, superioribus gradatim longioribus, dorso subglabra, apice valde convexa, margine undulata cum ciliolis minutis et setis crassis scabris fimbriata; *lamina* erecta vel (in vaginis infimis) interdum reflexa, anguste triangulata, ima basi utrinque latescens, plana vel revoluta, haud crispa superficie adaxiali subtiliter scabra, abaxiali valde scabra, marginibus spinulosa. *Rami* omnino glabri vel in internodiis infimis plus minusve asperi, interdum plus minusve farinosi, 3-5-foliati, in culmis hornotinis omnino glabri, in culmis annorum plurium internodiis supremis interdum in sulco puberuli. *Foliorum vaginae* glabrae vel raro sparsim setosae; *auriculae* et *setae orales* pervariabiles, in ramulis parce foliatis debiliter evolutae, in ramis ramulisque plurifoliatis vulgo valde evolutae; *ligula* usque ad 1.5 mm longa, dorso basin versus sparse puberula, apice valde arcuata, margine undulante sparse ciliolata; *petiolus* utrinque glaber vel subglaber; *foliorum laminae* usque ad 155 mm longae et usque ad 19 mm latae, vulgo multo breviores et angustiores, supra glabrae, subtus ima basi dense pilosae vel hirsutae, in medio sparse pilosae, apicem versus obscure scabrae, spinulis marginalibus eximie remotis et patentibus. *Inflorescentia* ignota.

Species marked by the following conspicuous characters: The sulcus of the internodes of the

culms and branches at first tinted or striped more or less conspicuously (some would say obscurely) with yellow or greenish golden, especially during the first year; the culm sheath always more or less conspicuously color-striate

in varying degrees of intensity at various levels of the culm, with white, cream, green, and wine, while fresh, and retaining visible variegation in light and dark tints of straw when dry. In the shape and coloration of the culm sheaths and

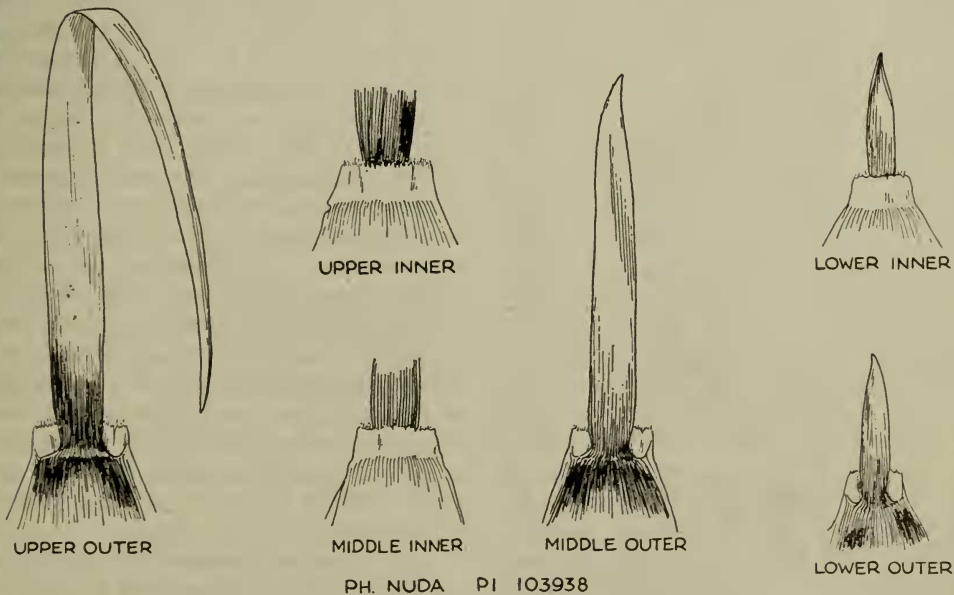
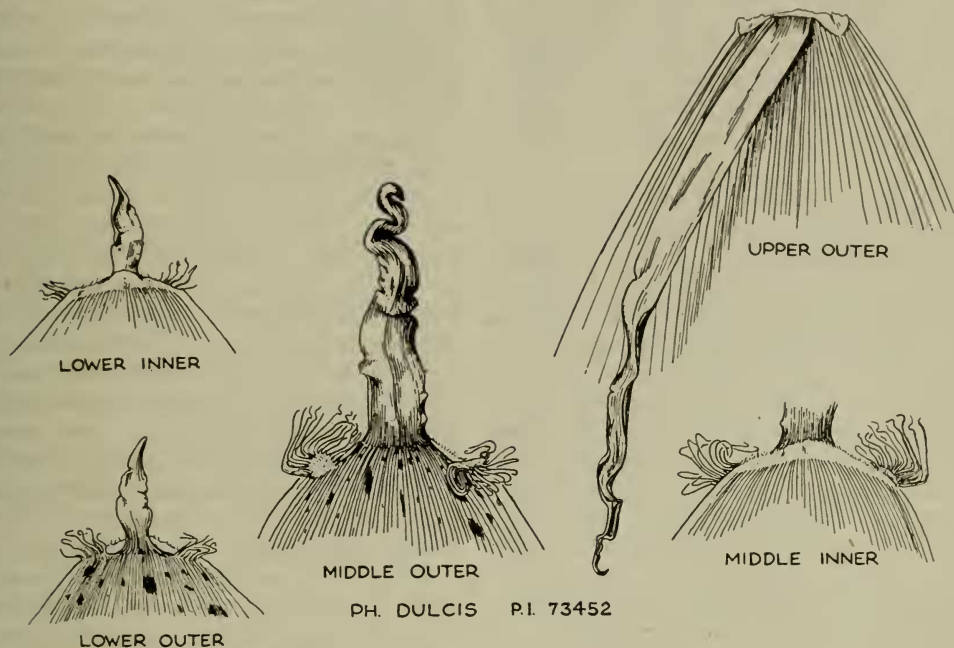


FIG. 2.—New species of *Phyllostachys*.



the relation of the auricles to the culm sheath blade, this species shows some resemblance to *Phyllostachys nidularia* Munro, from which it differs clearly, however, in the yellowish or greenish-golden sulcus of the internodes of the young culms and branches; the thinner, more flexible, entirely glabrous culm sheaths, the longer ligules of the culm sheath, the scabrousness of the internodes in young culms of mature stature, and the glabrous, less prominent culm sheath scars, and the less prominent culm nodes.

*Culms* up to 7.8 m tall and (int. V) 29 mm in diameter; *internodes* up to (no. XIII) 356 mm (V: 196 mm) long, in culms of mature stature more or less copiously farinose, retrorsely scabrous, and tinted or striped with yellow or greenish golden on the sulcus, especially in the first year; *nodes* glabrous, rather prominent but narrow; *farinose zone* usually extending both above and below the sheath scar; *culm sheath* oblong, rounded toward the apex, thin and flexible in texture, variable in color, always more or less conspicuously striped with white, yellow and (especially toward the base of the culm) wine and (especially toward the apex of the culm) green, and retaining, even in the dry state the variegation in the form of lighter and darker tints of straw, at first copiously and loosely (in plants of immature stature lightly) farinose, glabrous throughout, or the lower ones very rarely retrorse scabrous basally; *auricles* commonly not developed in the lowermost 4 or 5 sheaths, otherwise usually well developed, rarely all weak or lacking entirely, sometimes extremely variable in the same culm, commonly decurrent from the base of the blade, sometimes entirely distinct from the base of the blade, usually falcate or ovate, more or less excurrent, sometimes reflexed, when dry very thin and fragile and more or less crinkled; *oral setae* slender, flexuous, few to many, or (when the auricles are lacking) not at all developed, commonly crowded along the exterior (upper) margin of the auricles and fewer or none on the lower margin; *ligule* (in V) up to 3–4 mm long, progressively longer in the upper sheaths, subglabrous on the back, the apex strongly arched, the undulate margin ciliolate or fimbriate with coarse, scabrous processes; *sheath blade* erect or (in the lower sheaths) sometimes strongly reflexed, broadly to narrowly triangular, broadening abruptly

at the very base, flat or sometimes revolute, not at all crinkled, obscurely scabrous on the adaxial surface, strongly so on the abaxial, both margins spinulose. *Branches* 3–5-foliate, glabrous throughout or the lower internodes more or less scabrous, sometimes somewhat farinose, the twigs commonly 1–2-leaved, glabrous throughout on culms of the current year, the uppermost internodes often puberulent in older culms. *Leaf sheaths* glabrous or rarely sparsely setose; *auricles* and *oral setae* extremely variable, weakly developed in few-leaved twigs, commonly more strongly developed in twigs and branches with more leaves; *ligule* up to 1.5 mm long, sparsely puberulent, the apex strongly arched, the uneven margin sparsely ciliolate; *petiole* glabrous or subglabrous on both surfaces; *leaf blades* up to 155 mm long and up to 19 mm broad, usually much shorter and narrower, glabrous on the upper surface, densely pilose or hirsute at the very base, sparsely pilose in the middle and scabrous toward the tip on the lower surface, the marginal spinules usually distant from each other and more or less spreading. *Inflorescence* unknown.

TYPE: McClure 20971, collected April 29, 1941, at the Barbour Lathrop Plant Introduction Garden near Savannah, Ga., from permanent plot no. 31 (section C).

This bamboo was originally introduced into the United States from China by Frank N. Meyer in 1908. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 55713. It was carried for some years under the name of *Phyllostachys nevinii* Hance. Circumstantial evidence, however, led to the suspicion that this name was not properly applied to the present species. The type specimen of *P. nevinii*, which is deposited at Kew, was examined by the writer in 1935, and later by C. E. Hubbard, with a view to determining whether any close resemblance could be detected between it and the present plant. The concurrence of opinion is that the two represent entirely distinct species. Significant support is given to this view by the fact that this species has not come to light in, or anywhere near, the type locality of *P. nevinii* Hance, during the course of many years, diligent search.

An interesting characteristic of the species (at least of the plants grown in the United States)—one that detracts somewhat from the

value of many of the culms—is the rather frequent, but irregular, occurrence of one to several strongly geniculate nodes within the first meter from the ground. An experimental selection (P.I. 70741) was made by R. A. Young some years ago to ascertain if the occurrence of this character could be made more regular or more frequent by such selection, but no difference in its subsequent incidence has been noted.

The specific epithet alludes to the distinctive coloration of the sulcus of young culms and their branches.

*Phyllostachys dulcis*, sp. nov.

Species insignis culmis basin versus vulgo plus minusve curvatis, omnino glabris; internodiis copiose farinosis, tactu plus minusve valide striatis, interdum cum striis aureis linearibus obscure notatis; nodis infimis plerisque plus minusve valde gibbose incrassatis; vaginis culmi omnino glabris, fuscomaculatis, siccitate pallidissime stramineis; auriculis valde evolutis crassis, saepe plus minusve excurrentibus, novellis viridibus; lamina vaginarum culmi latiuscula, valde crispa. Species internodiis culmi glabris et plus minusve valde elevato-striatis *Phyllostachys vivacem* McClure simulans, e qua tamen differt habitu culmorum frondisque, auriculis vaginae culmi valde evolutis, vaginis culmi texturæ tenuioris et (novellis) plus minusve colorato-striatis, et forma ligulae vaginarum culmi.

*Culmi* usque ad vel ultra 10 m alti et usque (int. V) ad 57×60 mm diametro, ab initio omnino glabri farinosique; *internodia* usque (no. XVIII) ad 255 mm (V: 210 mm) longa, tactu plus minusve valde striata et saepe striis tenuibus albidis vel pallido-luteis variegata, ligno 5–6 mm crasso; *nodi* prominuli, inferioribus saepe supra cicatricem gibbose incrassatis; *zona farinosa* angusta, copiose farinosa; *vaginae culmi* oblongae, versus apicem late rotundatae, texturæ tenuis lentaeque, facile fissae, omnino glabrae, sparse floccoso-farinosae, novellis (in plantis staturæ maturae) tum striis latiusculis albidis vel pallido-luteis variegatis et maculis fuscis sparsim maculatis, siccatis pallidissime stramineis maculatisque sed haud colorato striatis; *auriculae* ovatae vel angusto-oblongae excurrentes, crassae, dense pubescentes; *setae orales* valide evolutae, *auriculis* et *setis oralibus* primo viridibus deinde fusco-stramineis; *ligula*

brevis, in vaginis superioribus vix vel paullum longior, dorso scabra, apice late arcuata, margine subtiliter ciliolata; *lamina vaginarum* anguste triangulata vel linearis, valde alveata crispaque, vulgo adscendens raro reflexa, superficie adaxiale basin versus hispidula, alioquin glabra vel subglabra. *Rami* comparate breves subaequales, glabri, primo plus minusve farinosi, ramis ramulisque plerisque 2–3-foliatis, ramis in surculis ex culmis decapitatis orientibus saepe 4–5-foliatis. *Vaginae foliorum* primo (dempto supremo valde pubescente) glabrae vel glabrescentes; *auriculae* et *setae orales* pervariabiles, saepissime haud evolutae, interdum (praesertim in surculis ex culmis decapitatis orientibus) valde evolutae; *ligula* valde exserta, mox fissa, dorso basin versus plus minusve hispidula, alioquin glabra, apice arcuata, margine undulata glabra vel subtiliter ciliolata; *petiolus* utrinque omnino glaber vel supra basin versus scaberulus; *laminae foliorum*, usque ad 100 mm longae et usque ad 16 mm latae, supra glabrae, subtus variabiliter pubescentes, vulgo saltem versus basin pilosae. *Inflorescentia* ignota.

Species distinguished by the following combination of characters: Culms commonly more or less strongly curved at the base, glabrous throughout; the internodes copiously farinose, more or less striate to the touch, often visibly striped with narrow cream or pale yellow lines, the lower nodes usually more or less strongly thickened asymmetrically, culm sheaths glabrous throughout, maculate with dark spots, very pale straw colored when dry, auricles thick, often more or less excurrent, green when fresh, culm sheath blade very strongly crisped. In its entirely glabrous culms, ribbed internodes, and asymmetrically thickened culm nodes, this bamboo somewhat resembles *Phyllostachys vivax* McClure but is readily distinguishable from the latter by the sparser maculation of the culm sheaths, the well-developed auricles and oral setae, the different shape of the culm sheath ligules, and the very pale straw color of the culm sheaths when dry.

*Culms* up to or exceeding 10 m tall and (int. V) up to 57×60 mm in diameter, glabrous and farinose throughout from the beginning; *internodes* up to (no. XVIII) 255 mm (V: 210 mm) long, more or less strongly ribbed (in the lower part of the culm at least) and very often verti-



cally striped with a few whitish or cream lines, the *wood* 5–6 mm thick; *nodes* somewhat prominent, the lower ones often asymmetrically thickened above the sheath scar; *farinose zone* relatively narrow, copiously farinose; *culm sheaths* oblong, rounded toward the apex, thin and tough, easily split, glabrous throughout, sparsely floccose-farinose, sparsely maculate (in plants of mature stature at least) with dark spots and (in fresh shoots) variegated with stripes of white or cream and, when dry, very pale straw in color with sparse persistent dark maculations but devoid of all color striation; *auricles* narrowly oblong, excurrent; *oral setae* well developed (the auricles and oral setae bright green when fresh, turning dark straw when dry); *ligule* short, scarcely or slightly longer in the upper sheaths, scabrous on the back, the apex arcuate, the undulate margin obscurely ciliolate; *sheath blade* narrowly triangular or linear, strongly alveate and crinkled, commonly ascending, rarely reflexed, hispidulous basally on the adaxial surface, otherwise glabrous or subglabrous. *Branches* relatively short, subequal, glabrous, at first more or less visibly farinose, branches and twigs usually 2–3-foliate, branches from shoots originating at the base of decapitated culms often 4–5-foliate. *Leaf sheaths* at first glabrous or glabrescent, excepting the uppermost persistently pubescent one; *auricles* and *oral setae* quite variable, often not at all developed, sometimes (particularly in shoots from decapitated culms) strongly developed; *ligule* strongly exserted, soon split, more or less hispidulous toward the base, otherwise glabrous, the apex convex, the undulate margin glabrous or obscurely ciliolate; *petiole* entirely glabrous on both sides or scaberulous basally on the upper surface; *leaf blades* up to 100 mm long and up to 16 mm broad, mostly much shorter and narrower, glabrous on the upper surface, of variable vesture on the lower surface, commonly pilose toward the base at least. *Inflorescence* unknown.)

TYPE: McClure 20974, collected April 29, 1941, at the Barbour Lathrop Plant Introduction Garden near Savannah, Ga., from permanent plot no. 70 (section C).

This bamboo appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 73452, where it is described as "the edible bamboo of central China." The material under this number was

presented to the U. S. Department of Agriculture in April 1927 by E. A. McIlhenny from plants cultivated in the bamboo garden at Avery Island, La. It represents one of the introductions of Frank N. Meyer that Mr. McIlhenny had received from the Department some years earlier.

The culms of this species, being generally rather strongly curved, with prominent, often asymmetrical thickened nodes, and culm walls of uneven thickness, are of little industrial promise. The shoots, however, have been pronounced, by both Dr. David Fairchild and Mr. McIlhenny, as the best-flavored of any of the kinds that they have tested. Concerning this species, Mr. McIlhenny says it is, in his opinion, the most rapid-growing and most prolific of the bamboos in his garden.

This species has been carried in the records of the Division of Plant Exploration and Introduction for many years under the name *Phyllostachys henryi* Rendle. There is no discernible basis for this identification, however, and it seems desirable to give the plant a clearly documented scientific name based on the vegetative characters by which it is so well distinguished. *P. henryi* Rendle was based on flowering material only, collected by A. Henry (no. 6338) at Nanto, Hupeh. The leaf sheath is described as having a *short, truncate* ligule, a character clearly shown by the type. The leaf sheath in our plant has a *long-exserted* ligule with a *rounded* apex. In view of the very slight variability in the shape and dimensions of this structure in the 20-odd other species of the genus, living plants of which have been carefully studied, it is considered sufficient to separate the two plants in question.

The specific epithet alludes to the superior palatability of the young shoots.

#### *Phyllostachys meyeri*, sp. nov.

Species insignis culmis (demptis cicatricibus puberulis, vaginarum) glabris, modice farinosis, vaginis culmi ima basi in zona angustissima puberulis, alioquin glabris, auriculis et setis oralibus in vaginis culmi haud evolutis, ligula longitudinis mediocris, apice late arcuata, margine haud crasse fimbriata, lamina lineari, plana vulgo haud vel vix crispa. Species simulans *Ph. auream* (Carr.) Riv. sed in notis sequentibus distinguenda: internodiis culmi abnominiter abbreviatis nullis; ligulis vaginarum

infimarum culmi longioribus et angustioribus; ligulis vaginarum superiorum culmi cum fimbriis marginalibus haud valde evolutis; ligula vaginarum foliorum valde exserta.

*Culmi* usque ad 9.4 m alti et usque (int. V) 45×47 mm diametro; *internodia* usque (no. XIX) ad 352 mm (V: 185 mm) longo, moderate farinosa, omnino glabra, *ligno* (int. V) 6–6.5 mm crasso; *nodi* prominuli, latiusculi, cicatrice primo pilis pallidis confertis in zona angustissima circumdata, mox glabrescente; *zona farinosa* angusta lente accrescens mox sordescens; *vaginae culmi* oblongae apice rotundatae, omnino glabrae vel raro marginibus sparsissime ciliatae, vix farinosae sed tactu ceratae, pleraque praecipue apicem versus cum maculis fuscis maculatae, in statu siccato lentae, subrigide coriaceae cum nervis crassis moderate prominentibus; *auriculae* et *setae orales* haud evolutae vel in culmis humilibus raro modice evolutae; *ligula* comparate brevis, haud valde exserta, dense hispidula, apice late arcuata, margine obscure ciliolata; *lamina* linearis vel sublinearis haud vel vix ad basin angustata, in vaginis inferioribus alveata, interdum plus minusve crispa, erecta, in vaginis saltem superioribus plana et plus minusve recurvata, utrinque obscure scabra, secus margines scabra. *Rami* 3–5-foliati, ramulis 2–3-foliatis, omnibus in internodiis superioribus secus sulcum pilis retrorse uncinatis dense pubescentibus alioquin omnino glabris, eorum vaginis glabris. *Vaginae foliorum* vestitu pervariabiles—in plantis humilis vulgo plus minusve pubescentes, sed in plantis staturae maturae saepissime omnino glabrae vel pro parte tantum sparse pubescentes; *auriculae* et *setae orales* in plantis humilibus valde evolutae sed in plantis staturae maturae haud vel vix evolutae; *ligula* valde exserta, fragilissima saepissime fissa, ima basi hispidula alioquin glabra, apice valde convexa, margine glabra vel sparsissime ciliolata; *petiolus* supra ima basi tantum pubescens, alioquin omnino glaber in plantis staturae maturae, sed in plantis humilibus utrinque praesertim in superficie inferiore dense pubescens; *laminae foliorum* lanceolatae vel oblongo-lanceolatae, usque ad 162 mm longae et 29 mm latae, supra glabrae, subtus ima basi dense pilosa apicem versus vel pilosae vel scabrae. *Inflorescentia* ignota.

Species distinct in the following combination of characters: Culms glabrous except the

sheath scars, moderately farinose, the culm sheaths with a very narrow puberulent band along the lower margin, otherwise entirely glabrous, lacking auricles and oral setae, the ligule of moderate length, the apex broadly arched, the margin not coarsely fimbriate, the sheath blade narrow, linear, usually not at all crinkled. Species closely resembling *Phyllostachys aurea* (Carr.) Riv. in superficial appearance but differing in the following characters: the complete lack of abnormally shortened internodes appearing so commonly in the culms of the latter species; the (vertically) longer and (transversely) narrower ligules of the lower culm sheaths; the not at all prominently fimbriate ligules of the upper culm sheaths; the strongly exerted ligule of the leaf sheaths.

*Culms* up to 9.4 m tall and (int. V) 45×47 mm in diameter; *internodes* up to (no. XIX) 352 mm (V: 185 mm) long, the surface moderately farinose, entirely glabrous, the *wood* (int. V) 6–6.5 mm thick; *nodes* only moderately prominent, rather broad, the sheath scar fringed at first with a dense, narrow band of very short, pale hairs, soon glabrescent, the *farinose zone* narrow, developing slowly and soon becoming gray to black; *culm sheaths* oblong, rather abruptly rounded at the apex, entirely glabrous or rarely with a few cilia along the margins, not noticeably farinose, but somewhat waxy to the touch, mostly somewhat maculate with smallish, smoky spots, especially toward the apex, tough, stiffly leathery, and with the coarse veins only moderately salient, when dry; *auricles* and *oral setae* not at all developed except rarely in very small culms where, in the upper sheaths a few slightly developed ones may occasionally be found; *ligule* relatively short, only slightly wider than the base of the sheath blade, not conspicuously exerted, only slightly longer in the upper sheaths than in the lower, hispidulous on the back, the apex usually broadly arcuate, the margin slightly undulate, obscurely ciliolate; *sheath blade* sublinear to linear, erect or, in the upper part of the culm more or less drooping, alveate and often more or less crinkled in sheaths from the lower part of the culm when dry, flat in the upper ones, obscurely scabrous on both margins and on both surfaces, more strongly so toward the apex; *branches* 3-foliolate, twigs 2–3 leaved, puberulent with minute retrorsely hooked hairs along the sulcus of the



uppermost internodes, otherwise glabrous throughout, the branch sheaths glabrous; *leaf sheaths* of variable vesture, in small plants typically more or less densely pubescent, in large plants often glabrous or sparsely pubescent in part only; *auricles* and *oral setae* apparently developed in inverse proportion to the size of the plant—well developed in small plants and not at all or only weakly so in large ones; *ligule* prominently exserted, delicate and very frequently split longitudinally, hispidulous basally, otherwise glabrous, the apex strongly convex, the margin glabrous or sparsely ciliate; *petiole* puberulent at the base on the upper surface, otherwise glabrous throughout in all leaves on large plants, but pubescent on both surfaces (more densely so on the lower surface) in small plants; *leaf blades* up to 162 mm long and up to 29 mm broad, always glabrous on the upper surface, densely pilose basally and decreasingly so toward the apex on the lower surface, more densely so in small, young plants, more weakly so in the first leaves of large plants. *Inflorescence* unknown.

TYPE: McClure 20984, collected April 29, 1941, at the Barbour Lathrop Plant Introduction Garden, near Savannah, Ga., from permanent plot no. 32 (section C).

This bamboo was introduced into the United States from China by Frank N. Meyer. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 116768. The original records pertaining to this bamboo apparently were confused in the beginning with those belonging to other introductions, so that it is not possible to give any information as to the precise origin of this bamboo or the part it plays in the local Chinese economy. Some propagating material of this species has been distributed in this country. A thriving colony an acre or more in extent is to be found on the experimental farm of the Florida State Agricultural College at Gainesville, Fla.

*Phyllostachys nuda*, sp. nov.

Species insignis culmis glabris, tactu striatis, plus minusve copiose farinosis; vaginis culmi laxe farinosis, vulgo tactu glabris vel plerisque (pro parte saltem) inter nervos valde prominentes vel scabris vel cum unguellis antrorsis munitis, manifeste fusco-maculatis, siccatae conferte et crasse nervosis, fusco-stramineis; auriculis et setis oralibus haud evolutis,

ligula valde exserta, apice truncata margine plus minus valde ciliolata, lamina vaginae lanceolato-lineari, plus minus patente, plerumque haud valde reflexa, auriculis et setis oralibus in vaginis foliorum haud evolutis. Species valde simulans *Phyllostachys flexuosam* Riv. sed distinguenda vaginis culmae inter nervos prominentes scabris, vaginis foliorum sine auriculis et setis oralibus. Species valde affinis *Phyllostachys arcanae* McClure sed conformatione apicis ligulae sat distincta.

*Culmi* usque ad 5.5 m alti et (int. V) 30 mm diametro, omnino glabri; *internodia* primo (praecipue sub nodis) plus minusve copiose farinosa, tactu striata, usque (no. XIV) 310 mm (V: 170 mm) longo, ligno 4 mm crasso; *nodi* prominuli; *vagina* oblonga, apice versus leniter angustata, saltem infimis fusco-maculatis, tactu raro omnino glabra sed vulgo (saltem in parte superiore) inter nervos valde prominentes cum unguellis antrorsis aspera, in statu siccato subcoriacea fissilis; *auriculae* et *setae orales* haud evolutae; *ligula* longe exserta, dorso scabra, apice truncata, margine ciliata; *lamina* fere erecta, rare valde reflexa, infimis lanceolatis alveatis plus minusve undulantibus, superioribus lineari-lanceolatis planiusculis, omnibus utrinque et in marginibus antrorse scabris. *Rami* glabri, 3-4-foliati, ramulis vulgo 2-foliatis. *Vaginae foliorum* glabrae vel suprema setis retrorsis setulosae; *auriculae* et *setae orales* haud evolutae; *ligula* longe exserta, dorso scabra, apice convexa, margine primo ciliolata demum sensim diffracta; *petiolus* subtus glaber, supra versus basin hispidulus; *laminae foliorum* lanceolatae vel lineari-lanceolatae, usque ad 150 mm longae et 22 mm latae, supra glabrae et nitidae, secus marginem alteram omnino glabrae, secus alteram scabrae. *Inflorescentia* ignota.

Species distinguished by the following combination of characters: Culms glabrous, striate to the touch, more or less copiously farinose; culm sheaths loosely farinose, sometimes glabrous to the touch but usually provided, in part at least, with minute antrorse hooks secluded between the coarse veins; irregularly maculate or stained with dark spots, dark straw in color and densely and coarsely nervose when dry; the auricles and oral setae not developed; the ligule strongly exserted, truncate at the apex, ciliate along the margin; sheath blades lanceolate-linear, more or less spreading, usually not strongly reflexed; auricles and oral

setae not developed in leaf sheaths. Species strongly resembling *Phyllostachys flexuosa* Riv. from which it is readily distinguished by the scabrousness between the veins of the culm sheaths, and the complete lack of auricles and oral setae in the leaf sheaths. Closely related to *Phyllostachys arcana* McClure, from which it may be readily distinguished by the truncate ligule of its culm sheath.

*Culms* up to 5.5 m tall and (int. V) 30 mm in diameter, entirely glabrous; *internodes* more or less copiously farinose at first, especially immediately below the nodes, the surface perceptibly ribbed, entirely glabrous, up to (no. XIV) 320 mm (V: 170 mm) long, the *wood* about 4 mm thick; *nodes* rather prominent; *culm sheath* oblong, gently narrowed toward the apex, the lower ones, especially, usually more or less conspicuously marked by diffuse purplish splotches of variable size and intensity of color, often copiously and loosely farinose at first, sometimes entirely smooth to the touch or, more commonly, perceptibly scabrous with antrorse prickles disposed in variable density between the veins, especially in the upper part, tough and husk-like, though easily split, when dry, the veins then very prominent and close together; *auricles* and *oral setae* not at all developed; *ligule* prominently exserted, scabrous on the back, the apex truncate, the margin irregular and ciliate; *sheath blade* usually erect or strongly ascending, rarely more or less strongly reflexed in the lower sheaths, lanceolate, alveate and more or less perceptibly crinkled in the lower sheaths, to linear, lanceolate and flat or nearly so in the upper ones, obscurely antrorse-scabrous on both surfaces and on both margins. *Branches* entirely glabrous, usually 3-4-foliate, the twigs commonly 2-foliate. *Leaf sheaths* glabrous or the uppermost sometimes setulose with retrorse hairs; *auricles* and *oral setae* not developed; *ligule* in the lower sheath rather prominently exserted (that in the upper sheath obscure), scabrous on the back, the apex strongly convex, the margin minutely ciliolate at first, fragile, soon becoming more or less broken; *petiole* glabrous on the lower surface, hispidulous basally on the upper surface; *blades* up to 150 mm long and 22 mm broad, glabrous and shining on the upper surface, paler and antrorsely scabrous throughout the lower surface and sparsely hirsute basally with pale antrorse hairs, glabrous from base to tip on one margin, scabrous on the

other. *Inflorescence* unknown.

**TYPE:** McClure 20992, collected May 19, 1941, at the old Van Fleet residence, later the residence of P. H. Dorsett, near Glenn Dale, Md.

According to the records, this bamboo was originally introduced into this country from China by Frank N. Meyer. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 103938, which represents material secured by the Department of Agriculture from Mr. Dorsett's place.

A large and flourishing colony of this bamboo is under cultivation in the garden of the residence of Dr. George M. Darrow, near the Plant Introduction Garden at Bell, Md. The culms have been variously employed by Dr. Darrow about the premises for temporary structures such as arbors, trellises, fences, garden stakes, etc., while the shoots harvested to hold the colony in check find a welcome place in the family menu. From personal experience I know that the shoots of this bamboo, when small (4 to 6 inches long) are very palatable, among the best I ever ate. This species appears to be very hardy at this latitude, having been seriously injured by cold only a few times during the last fifteen years at the Darrow place. It deserves to be more widely cultivated as a source of poles and shoots for home use.

The specific epithet alludes to the absence of auricles and oral setae in both the culm sheaths and the leaf sheaths.

#### *Phyllostachys propinqua*, sp. nov.

Species insignis culmis omnino glabris ad primo (dempto zona angusta infra nodos) fere haud farinosis, vaginis culmi omnino glabris cum lamina anguste lineari, auriculis et setis oralibus vaginis culmi haud evolutis, ligula vaginalium culmi in apice valde arcuata, in margine haud crasse fimbriata insignis. Species praesertim quoad surculos novellos arcte simulans *Phyllostachys meyeri* McClure sed in notis saltem sequentibus distinguenda: cicatricibus in nodis culmorum glabris; lamina vaginalium culmi angustiore brevioraque; ligula praecipue in vaginis superioribus culmi valde arcuata; foliorum laminis plerumque (dempto basi hirsuto) subtus glabris.

*Culmi* usque ad 7 m alti et (int. V) 30×31 mm diametro, omnino glabri; *internodia* primo fere haud farinosa, usque (no. XI) ad 258 mm



(V: 171 mm) longa, *ligno* (int. V) circ. 5 mm crasso; *nodi* in cicatrice modice prominentes; *zona farinosa* angusta sed cicatricem superante, primo exigua deinde sensim valida; *vaginae culmi* anguste oblongae vel lineares, apice leniter rotundatae, omnino glabrae, haud vel subtilissime farinosae, in siccitate tenuiter subcoriaceae, plus minusve valde nervosae; *auriculae* et *setae orales* haud evolutae; *ligula* dorso obscure scabra, apice plus minusve valde arcuata, margine minute ciliolata; *lamina* patens (infimis reflexis), angusta, linearis, haud vel vix crispa, in superficie adaxiali scabriuscula, in abaxiali subglabra, siccata plus minusve valde alveata. *Rami* 3–5-foliati, eis et vaginis suis glabris, ramulis plerisque 3–4-foliatis. *Vaginae foliorum* glabrae; *auriculae* et *setae orales* pervariabiles, interdum haud evolutae, interdum nonnullae modice evolutae, interdum etiam praecipue in culmis vel humilibus juvenilibus vel depauperatis vel senescentibus valde evolutae; *ligula* valde exserta, dorso hispidula, apice arcuata, margine undulante subtiliter ciliolata; *petiolus* vulgo supra basin versus hispidulus, alioquin glaber; *lamina* vulgo usque ad 135 mm longa et usque ad 16 mm lata, subtus semper basin versus secus costam hirsuta, interdum in partibus vicinis pilosa, secus alteram marginem spinosula, alteram glabra. *Inflorescentia* ignota.

Species distinct in this combination of characters: Culms glabrous throughout and (excepting the narrow zone just below the nodes) almost not at all farinose, the culm sheaths glabrous and without auricles and oral setae, the ligule strongly arched, especially in the upper sheaths, and not coarsely fimbriate, the sheath blade very narrow and not or scarcely crinkled. This bamboo is very similar to *Phyllostachys meyeri* McClure in general appearance—especially that of the young shoots—but is distinct in at least the following characters: the glabrousness of the culm sheath scar, the narrower culm sheath blades, the strongly convex apex of the ligule of the culm sheath, the leaf blades normally not pubescent on the lower surface except along the midrib at the base. A further difference, hardly to be designated as more than a tendency, is the frequent occurrence, in *P. propinqua*, of culms with two or three more or less strongly geniculate nodes, usually within less than a meter of the base. In addition to the strong general re-

semblance of the two species in their “normal” expression, they have in common this expression which, under the circumstances described tends to obliterate differences normally shown in the pubescence of the leaf blades: In low, shrubby growth originating from decapitated or otherwise thwarted or stunted culms of both species, the leaf sheaths, petioles and lower surface of the leaf blades are densely pubescent, and the upper surface of the leaf blades is strongly scabrous throughout. Furthermore, in such plants there are often more leaves per twig than in the larger ones, and both the auricles and oral setae are more prominently developed on the leaf sheaths thereof.

*Culms* up to 7 m tall and (int. V) 30×31 mm in diameter, glabrous throughout; *internodes* up to (no. XI) 258 mm (V: 161 mm) long, the farinose zone rather narrow but extending slightly above the sheath scar, thin and indistinct at first, then gradually becoming distinct and more densely farinose (*branch buds* lacking at nodes 1–11 in the largest culm measured, the lower several in the series sometimes remaining undeveloped, but viable, for more than a year, an occurrence very rare in the genus); *culm sheaths* narrowly oblong or linear, gently rounded above to a narrow apex, entirely glabrous throughout, more or less prominently ribbed, tough and thinly coriaceous when dry (the basal ones distinctly thicker and stiffer, with less prominent nerves than the upper ones), lightly and irregularly maculate with small dark spots; *auricles* and *oral setae* not at all developed; *ligule* obscurely scabrous on the back, the apex more or less strongly convex, the margin minutely ciliolate; *sheath blade* very narrow, linear, often more or less perceptibly crinkled, slightly scabrous on the adaxial surface, subglabrous on the abaxial, those on the lower sheaths reflexed, those on the upper ones recurved, and flat or nearly so, all becoming more or less strongly alveate upon drying. *Branches* 3–5-foliate. *Leaf sheath* glabrous; *auricles* and *oral setae* of variable occurrence and development, sometimes lacking entirely, sometimes moderately well developed and sometimes, especially in the leaf sheaths of low shrubby growth originating from decapitated or otherwise thwarted or stunted culms, or from old culms, the auricles and oral setae very strongly developed; *ligule* strongly exserted, hispidulous on the back, the apex

strongly arched, the margin irregular, minutely ciliate; *petiole* usually hispidulous basally on the upper surface, otherwise glabrous; *leaf blades* commonly up to 135 mm long and up to 16 mm broad, always hirsute along the midrib basally on the lower surface, and often more or less pilose nearby, otherwise glabrous throughout. *Inflorescence* unknown.

TYPE: McClure 20976, collected April 29, 1941, at the Barbour Lathrop Plant Introduction Garden, near Savannah, Ga., from permanent plot no. 10 (section C).

This bamboo was introduced into the United States from China by the writer in 1926. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under

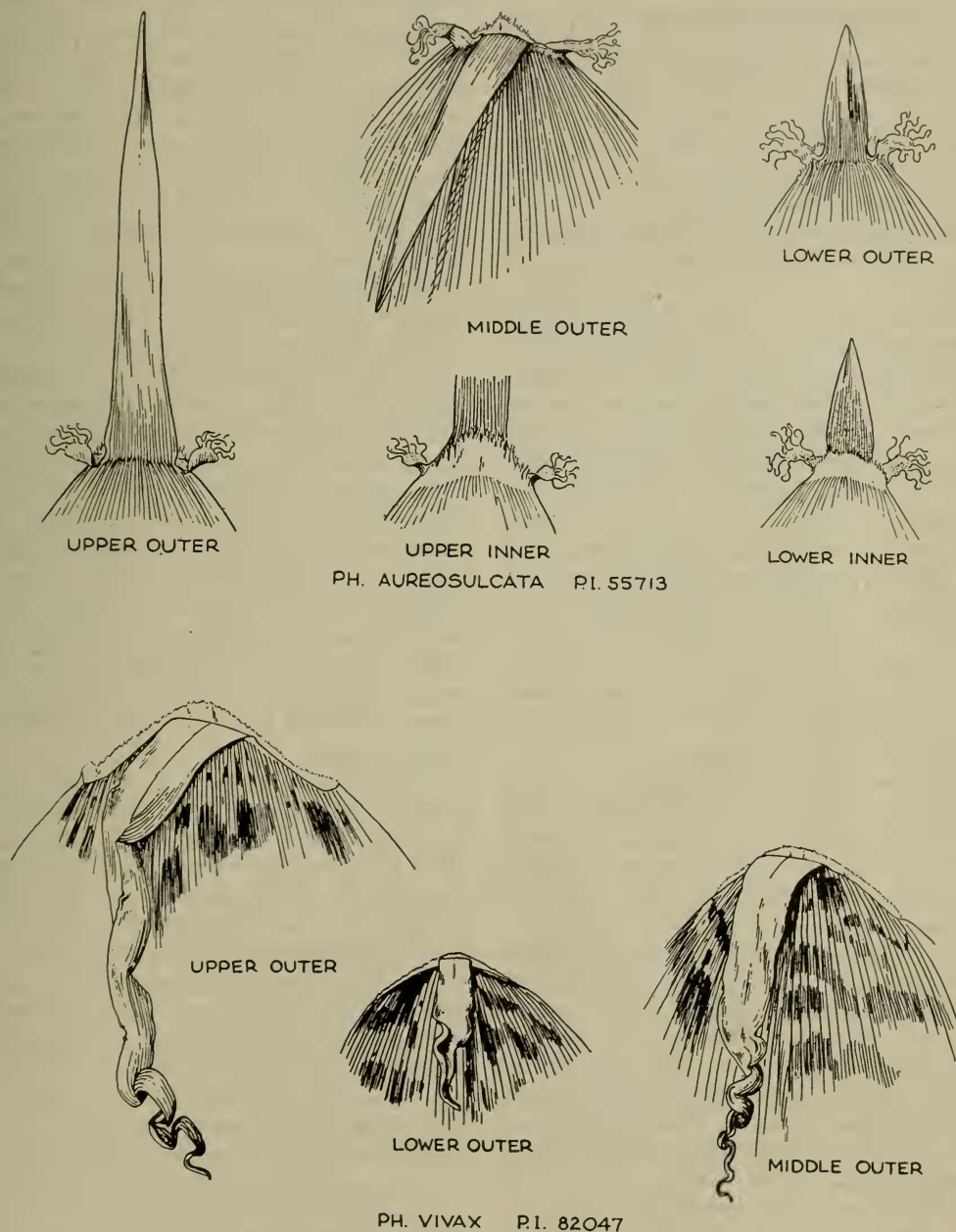


FIG. 3.—New species of *Phyllostachys*.



P.I. 76649. In the notes given there, the comparison between this species and P.I. 67398 (*Phyllostachys rubromarginata* McClure) quoted from a Chinese informant, does not apply, as the culm sheaths of both species are entirely glabrous.

The specific epithet alludes to the close resemblance between this species and *P. meyeri*.

***Phyllostachys vivax*, sp. nov.**

Species aspectu nobilis frondibus elegantibus subpendulis, culmis altis omnino glabris, internodiis copiose farinosis, tactu striatis, vaginis culmi omnino glabris fusco-maculatisque, ligula vaginarum culmi perbrevis, valde arcuata, latissima, longe utrinsecus decurrente, auriculis et setis oralibus (vagarum culmi staturae maturae) haud evolutis insignis.

Species internodiis culmi glabris et tactu striatis, nodis saepe gibbose incrassatis simulans *Phyllostachys dulcem* McClure sed auriculis in vaginis culmi (plantae staturae maturae) numquam evolutis, earumdem ligula perbrevis utrinsecus longe decurrente distinguenda. Species notis nonnullis vaginae culmi simulans *Phyllostachys sulphureae* var. *viridem* Young et praeterea *P. bambusoides* Sieb. & Zucc. ex quibus distat characteribus saltem sequentibus inter alias: internodiis culmi tactu valde striatis, nodis plerisque supra cicatricem gibbose incrassatis, vaginis culmi tenuioribus, ligula perbrevis, praesertim in vaginis inferioribus utrinsecus longe decurrente, habitu subpendula laminarum foliorum.

*Culmi* usque ad 11.8 m alti et (int. V) 70 × 75 mm diametro, omnino glabri; *internodia* usque (no. XIX) ad 327 mm (V: 243 mm) longa, tactu striata, ab initio copiose farinosa, supra nodos saepissime plus minusve gibbose incrassata, *ligula* 7–8 mm crasso; *nodi* in cicatrice crassa subito prominentes et supra cicatricem aperte incrassati; *zona farinosa* latiuscula copiose farinosa; *culmi vaginae* oblongae versus apicem convexum rotundatae, dorso marginibusque omnino glabrae, ab initio farinosae, maculis fuscis conferte maculatae, siccatae crasse nervosae, tenuiter coriaceae; *auriculae* et *setae orales* (demptis plantis juvenilibus) numquam evolutae; *ligula* perbrevis valde arcuata, utrinsecus longe decurrens, dorso subglabra, margine ciliolata vel subglabra. *Lamina vaginarum* anguste tri-

angulata vel sublinearis, valde alveata cristaque, erecta vel reflexa, utrinsecus subglabra. *Rami* comparate breves, internodiis glaucis vel supremis in sulco puberulis deinde sensim glabrescentibus, ramis ramulisque plerisque 2–4-foliatis. *Foliorum vaginae* dorso glabrae marginibus ciliolatae; *auriculae* in vaginis supremis saepe haud evolutae, alioquin debiliter vel modice evolutae, ovatae, fragiles vulgo sensim fugantes; *setae orales* saepe mox fugantes, in vaginis superioribus saepe paucae adpressaeque, in inferioribus plures radiataeque; *ligula* brevis, dorso subtiliter scabra, apice arcuata mox fissa, margine undulata subtiliter ciliolata; *petiolus* supra basin versus vulgo puberulus vel scaber, subtus apicem versus interdum pilosus, alioquin utrinque glaber; *foliorum laminae* usque ad 175 mm longae et usque ad 25 mm latae, supra glabrae nitidaeque, basin versus secus costam pilosae, alioquin subtilissime scabrae. *Inflorescentia* ignota.

Species of striking appearance with elegant subpendent foliage, readily distinguishable from the other species by the following characters: The glabrous culms, with copiously farinose, rather prominently ribbed or striate internodes, the culm sheaths thinnish, glabrous, densely maculate with smoky spots, the ligule of the culm sheath very short, strongly arcuate, long decurrent on each side of the apex of the sheath especially in the lower sheaths, the sheath blade narrow and very much crinkled, the auricles and oral setae never developed in the sheaths of culms of mature stature.

This species is perhaps at first sight most likely to be confused with *Phyllostachys sulphurea* var. *viridis* Young, or *P. bambusoides* Sieb. & Zucc. From both of these, however, it may readily be distinguished by the striate internodes and peculiarly shaped nodes of the culms, the entire lack of any vestige of auricles on the culm sheaths (at least in plants of mature stature) and the very short, decurrent culm sheath ligule. Once familiar, the habit of the foliage is sufficient to distinguish this species from the others even at a distance. In the ribbed surface and glaucousness of the internodes and the complete glabrousness of the culms, mature plants of this species resemble those of *P. dulcis* McClure, but the latter is distinguishable by the well developed green auricles and oral setae on its more or less

conspicuously color-striate fresh culm sheaths, and the less decurrent ligule of the lower culm sheaths.

*Culms* up to 11.8 m tall and (int. V) 70×75 mm in diameter; *internodes* up to (no. XIX) 327 mm (V: 243 mm) long, strongly striate to the touch, glabrous throughout, copiously farinose from the first, the part above the node commonly perceptibly larger in diameter than the part below the node and somewhat gibbous, the *wood* 7–8 mm thick; *nodes* flaring rather abruptly at the sheath scar and thickened somewhat asymmetrically above it; *farinose zone* broadish, copiously farinose; *culm sheaths* entirely glabrous, farinose, densely maculate with dark spots, coarsely nerveous and thinly coriaceous when dry; *auricles* and *oral setae* lacking entirely in plants of mature stature (more or less well developed in small plants); *ligule* short, subglabrous, the apex strongly arcuate, the margin ciliate or subglabrous; *sheath blade* narrowly, triangular to sublinear, strongly crinkled, erect or reflexed, subglabrous on both surfaces. *Branches* relatively short, glaucous, glabrous or several of the uppermost internodes pubescent at first then glabrescent, the branches and twigs 2–4-foliate. *Leaf sheaths* glabrous, the margins ciliate; *auricles* sometimes slightly to moderately developed, ovate, all fragile and gradually disappearing; *oral setae* fragile, fugaceous, few and appressed in the upper sheaths, more numerous and radiate in the lower sheaths; *ligule* short, usually splitting in the middle, dorsally obscurely scabrous, the apex arcuate, often more or less concave in the middle, the undulate margin obscurely ciliate; *petiole* commonly puberulent at the base on the upper surface and often pilose toward the base of the leaf blade on the lower surface, otherwise glabrous on both surfaces; *leaf blades* up to 175 mm long and up to 25 mm broad, glabrous and shining above, the lower surface usually somewhat pilose along the midrib at the base, otherwise obscurely scabrous. *Inflorescence* unknown.

TYPE: McClure 21044, collected May–August 1942, at the Barbour Lathrop Plant

Introduction Garden near Savannah, Ga., from permanent plot no. 72 (section C).

This is one of Frank N. Meyer's introductions from China, but its precise origin is unknown. It appears in the Plant Inventory of the Division of Plant Exploration and Introduction under P.I. 82047, where the following information is given: "This bamboo, according to a statement of Nov. 19, 1929, from Mr. E. A. McIlhenny, is one of two introductions sent to him from Chico, Calif., by the Department of Agriculture, April 3, 1914, under nos. 23242 and 23243."

Although he was at first of the opinion that it represented *Phyllostachys mitis* of authors (*P. sulphurea* var. *viridis* Young) the plant was later recognized by Mr. McIlhenny, in the course of his long experience in its cultivation, as distinct from that and all the other bamboos in his collection.

The writer, upon seeing only smallish culm shoots of the plant for the first time in 1935 took them to represent *P. bambusoides* or something very near to it. Mr. McIlhenny rightly disagreed firmly, and later communicated his reasons for his view. The relevant statements in a letter of June 4, 1941, from Mr. McIlhenny to Mr. R. A. Young, may be paraphrased as follows:

"The new growth of P.I. 82047 averages ten days or two weeks earlier than that of *P. bambusoides*. The plant is much more vigorous, reaches maturity much more quickly, and the culms have much thinner walls than those of *P. bambusoides*. The lower internodes of this plant are longer than those in *P. bambusoides*, and the sheath blade is not fluted or crinkled in the same manner as in *P. bambusoides*. The culms reach a much greater size in the same period of time when planted side by side with *P. bambusoides*. When the two were planted side by side P.I. 82047 completely shaded and killed the growth of *P. bambusoides*. I believe P.I. 82047 is distinct from *P. bambusoides* and much more valuable for culture in the United States."

The specific epithet alludes to the vigorous vegetative growth so vividly described by Mr. McIlhenny.